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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/510,389

12/14/2004

Nobuo Ishii

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EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT

PAPER NUMBER

1763

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/08/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

# Office Action Summary

Application No.

10/510,389

Applicant(s)

ISHII, NOBUO

Examiner

Rakesh K. Dhingra

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1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 14 December 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 12/04, 02/05
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al (US PGPub No. 2002/0038692) in view of Suzuki et al (US Patent No. 6,652,709).**

Regarding Claim 1: Ishii et al teach a plasma processing apparatus (Figures 1, 9, 14, 20) for effecting predetermined processing on a substrate by exposing the substrate to a plasma production region, comprising:

a chamber 11 in which the substrate 21 is introduced;

a top plate portion (dielectric plate 13) arranged above said substrate 21 introduced in said chamber, and forming a part of a wall of said chamber 11; and

an antenna portion 30 supplying a high-frequency electromagnetic field into said chamber to form the plasma production region in a region between said top plate portion 13 and said substrate 21 located in said chamber 11, wherein said antenna portion 30 includes a radial waveguide 36 having a predetermined inner diameter, said chamber 11 has a predetermined inner diameter in a portion containing said top plate portion 12 and said antenna portion 30 (paragraphs 0048-0058). Ishii et al also teach that by using formula 27 (paragraph 0144) it is possible to compute composite dielectric constant of the space portion containing the window and the slot antenna, if other variables like dielectric constant of top plate (window), dielectric constant of the space between window and antenna (air in this case),

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thickness of dielectric window and the gap between the window and the slot antenna are known (Figure 14 and paragraphs 0144-0146). Based on this composite dielectric constant, value of wavelength  $\lambda_{sub.g}$  (given in the claim) can be calculated (by using formula  $\lambda / \text{dielectric constant}$ ).

Ishii et al teach inner diameter of the radial waveguide (Figure 9A), but do not teach relative dimensions of the inner diameter of radial waveguide and the portion containing top plate portion and the antenna portion.

Suzuki et al teach a plasma apparatus (Figures 6A, 6B) for controlling standing waves in a radial waveguide comprising a chamber 1 with a dielectric window 4 as top wall, a circular waveguide 13 with an antenna having slots 23. Suzuki et al also teach diameter of window (like dimension B in the claim for the top plate portion) 4 is 299 mm, and inner diameter of waveguide disc is (152-96) 56 mm (like dimension A in the claim) [column 11, line 30 to column 12, line 25]. It would be obvious to optimize the dimension of top plate portion in the apparatus of Ishii et al as per relative dimensions of radial waveguide and window (top plate portion) as taught by Suzuki, as per other related factors like dielectric constant of top plate (window), dielectric constant of the space between window and antenna (air in this case), thickness of dielectric window and the gap between the window and the slot antenna to enable control standing waves in the radial waveguide and to obtain plasma of high density with uniformity (column 3, lines 32-37).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the dimensions of top portion and the radial waveguide in the apparatus of Ishii et al as taught by Suzuki, as per process limitations and other related factors like dielectric constant of top plate (window), dielectric constant of the space between window and antenna (air in this case), thickness of dielectric window and the gap between the window and the slot antenna, to enable control standing waves in the radial waveguide and to obtain plasma of high density with uniformity (column 3, lines 32-37).

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Regarding Claim 2: Ishii et al teach that inner diameter of chamber 11 is less than inner diameter of radial waveguide 36, that is claim formula  $C \leq A$ , is satisfied (Figure 1).

Regarding Claims 3, 4: Admitted prior art teach that top plate portion 13 comprises a dielectric material (paragraph 0049).

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh Dhingra



Parviz Hassanzadeh  
Supervisory Patent Examiner  
Art Unit 1763